

A study of karyological traits of male F₁ hybrids between *Mycalesis gotama fulginia* Fruhstorfer, 1911 and *Mycalesis madjicosa amamiana* Fujioka, 1975 (Lepidoptera, Satyridae)

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Abstract Male F₁ hybrids between *Mycalesis gotama fulginia* and *M. madjicosa amamiana* (cf. Table 1) possess twenty-eight haploid chromosomes. The shapes of the chromosomes at metaphases-I and -II are round or somewhat oval, and their outlines are even in polar view. The conjugation of the chromosomes at metaphase-I occurs in a regular fashion, showing the usual circular arrangement on the equational plane. These facts are suggestive of high chromosomal homology of their parents, revealing a systematic kinship between the two taxa of *Mycalesis*.

Key words Chromosomal homology, spermatocyte chromosomes, male F₁ hybrids between *Mycalesis gotama fulginia* and *M. madjicosa amamiana*, Satyridae.

As is well known, the genus *Mycalesis* (Satyridae) in Japan is comprised of four taxa and all of them possess twenty-eight haploid chromosomes (Saitoh *et al.*, 1994). Recently, through a comprehensive chromosome survey of males of F₁ hybrids from experimental crosses among many taxa of *Papilio*-swallowtails, whose great majority have an *n*, 30-karyotype (♂), it has become evident that an inquiry into the chromosome number distribution at metaphase-I (MI) in hybrids is useful for the analysis of systematic relatedness of their parent taxa (Maeki, 1992). One of us (M.T.) has hitherto attempted experimental crosses with the *Mycalesis* taxa of Japan (Takahashi, 1976, 1978, 1981, 1986, 1988) and, judging from the chromosomal study of Maeki (1992) on the *Papilio* hybrids, a karyological examination of male F₁ hybrids of *Mycalesis* with special reference to the chromosome number seems also significant for the phyloanalysis of the *Mycalesis* taxa of Japan.

This paper describes some karyological findings of male F₁ progenies from crosses between the two *Mycalesis* taxa, *M. gotama fulginia* Fruhstorfer, 1911 and *M. madjicosa amamiana* Fujioka, 1975.

Materials and methods

Hybrids between these two taxa were experimentally produced (cf. Takahashi, 1981, 1986). Testes taken from some of male F₁ pupae were fixed in PFA 3-mixture and sectioned (8 µm) according to the ordinary histological method. The sections were stained with Heidenhain's iron-haematoxylin.

The number and morphology of haploid chromosomes and behavior of anaphase chromosomes in the first and second divisions in these male hybrids were carefully examined, in comparison with those of the control male pupae of *M. gotama fulginia* from Shizuoka-shi and *M. madjicosa amamiana* from Sueyoshi, Naha-shi (Okinawa-ken). In addition, from a viewpoint of chromosomal homology in these hybrids, special efforts went into the investigation of the morphology of the conjugated MI chromosomes as well as their

arrangement on the equational plane.

The cross combination of the parents (original localities), number of male F_1 pupae used for chromosome counting, number of haploid complements subjected to chromosome counting, and the confirmed haploid chromosome number were shown in Table 1.

Observations

The haploid chromosome number of these male hybrids was uniformly twenty-eight (n , 28): no variations in the number of haploid chromosomes could be observed in the first and second divisions (Table 1).

The MI- and MII-chromosomes showed the usual circular arrangement. They were round or somewhat oval in shape, and the outline of individual chromosomes was even in polar view (Figs 1-4).

The conjugation of the chromosomes at MI occurred regularly. The conjugated elements showed an even arrangement on the same plane and the formation of the metaphase plate appeared regular. Each element was dumbbell-shaped in side view, keeping its long axis parallel or nearly parallel to the axis of the spindle-body (Fig. 2, arrowed).

The chromosomes remarkable in morphology or behavior were not observed during first and second divisions.

The above-mentioned karyological traits of these male F_1 hybrids were quite similar to those of the control males.

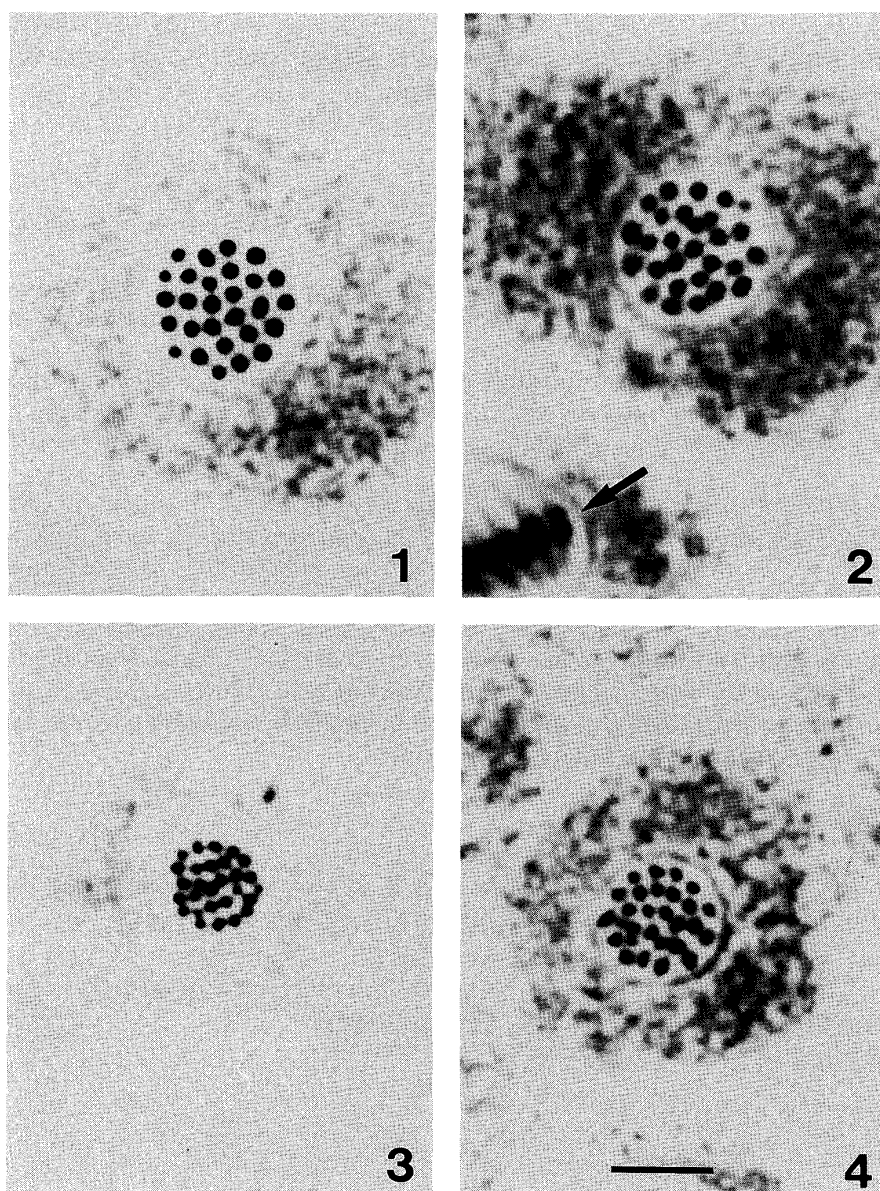
Remarks

Although the haploid chromosome number of 28 has been confirmed in males of the Shizuoka-population of *M. gotama fulginia* and the Sueyoshi-population of *M. madjicosa amamiana*, the Miyanoura-population of the former taxon and the Tokashiki-population of the latter one have still remained karyologically unexplored (Saitoh *et al.*, 1994). However, the constant occurrence of twenty-eight chromosomes in spermatocyte divi-

Table 1. Survey of spermatocyte chromosomes in F_1 hybrids between *Mycalesis gotama fulginia* and *M. madjicosa amamiana*

Cross combinations (Localities of parents*)	No. of F_1 male pupae used for chro. counting	No. of haploid complements subjected to chro. counting in :		Chromosome no. (n)
		1st division	2nd division	
<i>M. gotama fulginia</i> ♀ × <i>M. madjicosa amamiana</i> ♂				
(Shizuoka) × (Sueyoshi)	10	50	68	} 28
(Miyanoura) × (Tokashiki)	3	26	26	
<i>M. madjicosa amamiana</i> ♀ × <i>M. gotama fulginia</i> ♂				
(Sueyoshi) × (Shizuoka)	6	42	42	

*Miyanoura : Yaku-chō, Kagoshima-ken. Shizuoka : Shizuoka-shi. Sueyoshi : Naha-shi. Tokashiki : Tokashiki-son, Okinawa-ken.



Figs 1-4. Spermatocyte metaphase chromosomes of F₁ hybrids between *Mycalesis gotama fulginia* and *M. madjicosa amamiana*. 1. *M. gotama fulginia* ♀ (Shizuoka) × *M. madjicosa amamiana* ♂ (Sueyoshi). *n*, 28 (I). 2. *M. gotama fulginia* ♀ (Miyano-ura) × *M. madjicosa amamiana* ♂ (Tokashiki). *n*, 28 (I). Part of a metaphase plate (I; side view) is recognized at the bottom left-hand corner (arrowed). 3. *Ditto*. *n*, 28 (II). 4. *M. madjicosa amamiana* ♀ (Sueyoshi) × *M. gotama fulginia* ♂ (Shizuoka). *n*, 28 (I). I: First division. II: Second division. Scale bar represents *ca* 5 μ m.

sions in (Miyano-ura ♀ × Tokashiki ♂) F₁ males indicates strongly that the haploid complements in each of these two populations consist undoubtedly of twenty-eight chromosomes (*n*, 28), too. Consequently, these four populations belonging to the two different taxa will be similarly featured with the uniform karyotype of *n*, 28 (♂).

Furthermore, as above stated, there are no recognizable differences in the morphology of MI-chromosomes, as well as in the migratory behavior of anaphase I-chromosomes between the male F₁ hybrid and its controls. This indicates that the conjugation of the

chromosomes at MI has occurred quite regularly in these hybrid males, due most probably to the high chromosomal homology of the parents, and suggests a systematic kinship between the two *Mycalesis* taxa crossed.

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摘 要

ヒメジャノメ (静岡及び宮之浦) とリュウキュウヒメジャノメ奄美沖繩亜種 (末吉及び渡嘉敷) の雑種第一代雄の核学的特徴の検索 (斎藤和夫・阿部東・高橋真弓)

所検の雑種第一代雄の染色体数はすべて n , 28 であった。また、精母細胞の第一分裂, 第二分裂および中期染色体の形状には特に異常はみられないことが確かめられた。これらの核学的所見は、両者の系統的近縁性を示唆していると判断される。

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